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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/087,566 | 03/01/2002 | Masahiro Furo | 134.142 | 3943 |

7590 03/19/2004
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EXAMINER

XU, LING X

ART UNIT PAPER NUMBER

1775

DATE MAILED: 03/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/087,566

Applicant(s)

FURO ET AL.

Examiner

Ling X. Xu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 25-72 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 25-72 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicants' amendments filed on 1/26/2004 have been entered. Claims 1-24 have been cancelled. Claims 25-72 have been added.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 25-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Copetti et al. (US 2001/0017770).

Copetti discloses a module comprises a first conducting layer on an insulating substrate (Page 1, [0008]). The conducting layer consisting mainly of Al doped with a few percents of Si (page 1, [0022]). Embodiment 3 shows that Al is doped with 4% of Si (Page 4, [0075]), which is within the range recited in claim 26.

Copetti also discloses the insulating substrate is made of alumina (page 1, [0018]).

Since Copetti discloses the module comprises the same metal alloy layer as claimed, the same metal alloy layer would inherently have the same properties as claimed such as having the Vickers hardness of not less than 25 and not more than 40.

Claim Rejections - 35 USC § 103

3. Claims 25-28, 30-32, 35-36, 49-52, 54-56 and 59-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose et al. (US 6,122,170) in view of Boutin et al (US 4,222,774).

With respect to claim 25, Hirose discloses a power module board comprise an insulting substrate board comprises a ceramic substrate and a metal layer consisting mainly of aluminum (Col. 4, lines 15-20).

With respect to claims 30, 36, 54 and 60, Hirose discloses the ceramic substrate board is aluminum nitride or silicon nitride (Col. 4, lines 13-20).

With respect to claim 49, Hirose discloses a power module board comprises a semiconductor chip, IGBT chip or the like, fixed onto at least one surface of the ceramic base plate with a conductive layer made of Al (Col. 9, lines 5-15) interposed therebetween and another metal layer also made of Al (Col. 9, lines 5-15) formed onto other surface of the ceramic base pate (Abstract). The conductive layer and the metal layer disclosed by Hirose are considered functionally equivalent to the claimed metal layers.

Hirose further discloses a metal film (the same as the claimed “metal base plate”) is provided entirely on the rear surface of the ceramic base plate (Col. 9, lines 15-25).

Hirose does not disclose the metal layer comprises small amount of Si, Mn, and/or Mg.

However, with respect to claims 26-28, 31-32, 35, 50-52, 55-56, and 59, Boutin teaches an aluminum alloy for use in the production of the articles subjected to elevated temperature comprises 1.0-1.5% of Si, less than 0.2% of Mg and 0.9-1.5% of Mn, Ni of more than 0.05% and Ni+ Fe+ Co is 0.8-2% (Abstract).

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Boutin also teaches that the aluminum alloys has improved mechanical characteristics during and after the aluminum alloys exposure to elevated temperature (Col. 1, lines 1-25).

Therefore, it would have been obvious to one of ordinary skill in the art to use the aluminum alloy as taught by Bountin in Hirose's aluminum layer in order to improved mechanical characteristics during and after the aluminum layer exposure to elevated temperature when the power module has large amount of heat build up during the operation process.

Since Hirose and Boutin disclose the module comprises the same metal alloy layer as claimed, the same metal alloy layer would have the same properties as claimed such as having the Vickers hardness of not less than 25 and not more than 40.

4. Claims 29, 33-34, 53 and 57-58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose and Boutin, as applied to claims 25-28, 30-32, 35-36, 49-52, 54-56 and 59-60 above, and further in view of Auran et al. (US 6,153,025).

As stated above, Hirose and Boutin disclose the insulating surface board and the power module as recited in claims 25-28, 30-32, 35-36, 49-52, 54-56 and 59-60.

Hirose and Boutin do not disclose the aluminum alloy includes Cu and Zinc as recited in claims 29, 33-34, 53 and 57-58.

Auran teaches the aluminum based alloy comprising controlled amount of copper (up to 0.50%), zinc (up to 0.70%), silicon, and manganese has superior corrosion-resistant and high tensile strength (abstract and col. 1, lines 50-55).

Therefore, it would have been obvious to one of ordinary skill in the art to add a small amount of copper and zinc to aluminum based alloy in order to obtain aluminum alloy with high corrosion-resistant and tensile strength, as taught by Auran.

5. Claims 37-40, 42-44, 47-48, 61-64, 66-68 and 71-72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose and Boutin, as applied to claims 25-28, 30-32, 35-36, 49-52, 54-56 and 59-60 above, and further in view of Yoshida et al (US 5,213,877).

As stated above, Hirose and Boutin disclose the insulating surface board and the power module as recited in claims 25-28, 30-32, 35-36, 49-52, 54-56 and 59-60.

Hirose and Boutin do not disclose the ceramic substrate and metal alloy layer is bonded through a brazing material layer.

However, bonding ceramic substrate and metal alloy layer through a brazing material layer is well known in the art.

For instance, Yoshida teaches the ceramic substrate bonded to a conductive layer formed of aluminum alloy by a brazing alloy layer (abstract).

Yoshida also teaches the brazing alloy layer can reduce the thermal stress and provide strong adhesion between the ceramic substrate and the conductive layer (abstract and col. 6, lines 60-67).

Therefore, it would have been obvious to one of ordinary skill in the art to bond the ceramic substrate and the metal alloy layer through a brazing alloy layer in order to provide strong adhesion and reduce thermal stress between the ceramic substrate and the metal alloy layer.

6. Claims 41, 45-46, 65 and 69-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hirose, Boutin and Yoshida, as applied to claims 37-40, 42-44, 47-48, 61-64, 66-68 and 71-72 above, and further in view of Auran et al. (US 6,153,025).

As stated above, Hirose, Boutin and Yoshida disclose the insulating surface board and the power module as recited in claims 37-40, 42-44, 47-48, 61-64, 66-68 and 71-72.

Hirose, Boutin and Yoshida do not disclose the aluminum alloy includes Cu and Zinc as recited in claims 41, 45-46, 65 and 69-70.

Auran teaches the aluminum based alloy comprising controlled amount of copper (up to 0.50%), zinc (up to 0.70%), silicon, and manganese has superior corrosion-resistant and high tensile strength (abstract and col. 1, lines 50-55).

Therefore, it would have been obvious to one of ordinary skill in the art to add a small amount of copper and zinc to aluminum based alloy in order to obtain aluminum alloy with high corrosion-resistant and tensile strength, as taught by Auran.

Response to Arguments

7. Applicant's arguments filed 1/26/2004 have been fully considered but they are not persuasive.

Applicant argues that the Vickers hardness of the alloys may vary accordingly to the processes of hardening even if the compositions are the same.

However, based on the disclosure of the present applicant, the claimed Vickers hardness of the metal alloy is solely based on the composition of the alloy, see specification of the present

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application on page 5. The Examples and Comparative Examples on pages 6-38 of the specification also show the Vickers hardness of the claimed metal alloy varies according to the composition of the alloys. Since the prior arts disclose the same composition of the alloys as claimed, the same composition would have the same properties including Vickers hardness as claimed. Applicant fails to provide evidence that the claimed Vickers hardness of the claimed alloy is based on the processes of hardening.

Conclusion

8. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ling X. Xu whose telephone number is 571-272-1546. The examiner can normally be reached on 8:00 - 4:30 Monday - Friday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah D. Jones can be reached on 571-272-1535. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ling X. Xu
Examiner
Art Unit 1775

lx


DEBORAH JONES
SUPERVISORY PATENT EXAMINER